We claim:

1. A method for delivering in vivo a chimeric oligonucleotide into target cells of an animal or human tissue, comprising the steps of :

a) topically applying to or injecting into the patient tissue, or a patient tissue adjacent to the patient tissue containing said target cells, a composition comprising said chimeric oligonucleotide; and

b) transferring said chimeric oligonucleotide into said target cells by iontophoresis.

2. The method of claim 1, wherein step b) is carried out prior to, during or after the step a).

3. The method of claim 1, wherein step a) is a step of injecting said composition.

4. The method of claim 1, wherein said chimeric oligonucleotide comprised in the composition is capable of specifically hybridizing with a sequence of a genomic DNA contained in said target cells.

5. The method of claim 1, wherein said chimeric oligonucleotide comprised in the composition is a chimeric oligonucleotide capable of modified the expression products of a target gene of said target cells.

6 The method of claim 1, wherein said chimeric oligonucleotide comprised in the composition is an oligonucleotide containing at least a sequence complementary according to Watson-Cricks rules to a target gene of said cells with the exception of at least one nucleotide which is desired to be inserted, deleted or substituted in said target gene.

7. The method of claim 1, wherein said chimeric oligonucleotide comprised in the composition is a chimeric oligonucleotide DNA/2'OMcRNA type designed with two blocks of 2'O-methyl RNA residues flanking a stretch of DNA, poly(T) hairpin loops and a G-C clamp and wherein part of said DNA/2'OMeRNA sequence is complementary to a genomic DNA sequence of a target gene of said cells with the exception of at least single mismatched nucleotide in the DNA stretch when aligned with the target genomic DNA sequence.

8. The method of claim 7, wherein said chimeric oligonucleotide comprised in the composition is a chimeric oligonucleotide DNA/2'OMeRNA wherein at least part of that DNA/RNA sequence is complementary to a genomic DNA sequence of a target mutated gene

of said cells, said mutation being responsible for an inherited pathology, with the exception of that mutation which is desired to be reverted in said target gene.

9. The method of claim 1, wherein the tissue containing said target cells is selected from the group consisting of eye tissues, skeletal muscle tissue, epidermal and dermal tissue.

10. The method of claim 1, wherein the tissue containing said target cells is selected from the group consisting of eye tissues and wherein said chimeric oligonucleotide comprised in the composition contains at least a sequence complementary to a genomic DNA sequence of a target gene, said target gene when mutated being at least partially responsible of an eye inherited pathology.

11. The method of claim 8, wherein the eye tissue containing said cells is retina.

12 The method of claim 8, wherein step a) is a step of intravitcal injection of the composition comprising said chimeric oligonucleotide.

13. The method of claim 1, wherein said chimeric oligonucleotide is a chimeric oligonucleotide DNA/2'OMeRNA type wherein at least part of the sequence of said oligonucleotide is complementary to a genomic DNA sequence fragment of the murine gene encoding the cGMP-phosphodiesterase β-subunit exhibiting the non-sens C→A mutation in the codon 347 of the cDNA of part of said gene leading to retinitis pigmentosa disease, with the exception of that mutated nucleotide A which is replaced by C in said part of the sequence of said oligonucleotide.

14. The method of claim 13, wherein said chimeric oligonucleotide is selected from the group consisting of:

- the chimeric oligonucleotide DNA/2'OMeRNA type having the sequence SEQ ID No. 1; and

- a DNA/2'OMeRNA type chimeric oligonucleotide sequence of which comprising the essential elements of the sequence SEQ ID No. 1 capable of reverting the non-sens C→A mutation in the codon 347 of the cDNA of the murine gene encoding the cGMP-phosphodiesterase β-subunit in animal or human.

15. The method of claim 1, wherein said chimeric oligonucleotide is a chimeric oligonucleotide DNA/2'OMeRNA type wherein at least part of the sequence of said

oligonucleotide is complementary to a genomic DNA sequence fragment of the mouse or human gene encoding the transcription factor HIF1α, with the exception of at least one nucleotide which has been deleted, inserted or substituted in said part of that complementary oligonucleotide, the expressed HIF1α protein coded by the sequence wherein said fragment contains said at least one deleted, inserted or substituted nucleotide being incapable of promoting hypoxia induced neovascularization in human or in mouse.

16. The method of claim 15, wherein said complementary oligonucleotide of the DNA/2'OMeRNA type chimeric oligonucleotide is selected from the group consisting of:

- an oligonucleotide capable of inducing the mutation E142-STOP in the murine or human transcription factor HIF1α; and

- the oligonucleotide having the sequence SEQ ID No. 2 or an oligonucleotide comprising a fragment thereof capable of inducing the same mutation.

17. The method of claim 1, wherein said chimeric oligonucleotide is a chimeric oligonucleotide DNA/2'OMeRNA type wherein at least part of the sequence of said oligonucleotide is complementary to a genomic DNA sequence fragment of the murine or human RP1 gene, with the exception of at least one nucleotide which has been deleted, inserted or substituted in said part of that complementary oligonucleotide.

18. The method of claim 17, wherein said complementary oligonucleotide of the DNA/2'OMeRNA type chimeric oligonucleotide is selected from the group consisting of:

- an oligonucleotide capable of reverting the mutation K296E or R677-STOP in the human RP1 protein;

- the oligonucleotide having the sequence SEQ ID No. 3 or an oligonucleotide comprising a fragment thereof capable of reverting the same mutation K296E; and

- the oligonucleotide having the sequence SEQ ID No. 4 or an oligonucleotide comprising a fragment thereof capable of reverting the same mutation R677-STOP.

19. The method of claim 17, wherein said complementary oligonucleotide of the DNA/2'OMeRNA type chimeric oligonucleotide is selected from the group consisting of:

- an oligonucleotide sequence capable of inducing the mutation K296E or E348-STOP in the murine RP1 protein sequence;

- the oligonucleotide having the sequence SEQ ID No. 5 or an oligonucleotide comprising a fragment thereof capable of reverting the same mutation K296E; and

- the oligonucleotide having the sequence SEQ ID No. 6 or an oligonucleotide comprising a fragment thereof capable of reverting the same mutation E348-STOP.

20. The method of claim 1, wherein the iontophoresis system used in step b) is a device selected in the group consisting of the devices disclosed in the following patents: U.S. No. 4,141,359 issued February 27, 1979; U.S. No. 4,250,878 issued January 17, 1981; U.S. No. 4,301,794 issued November 24, 1981; U.S. No. 4,747,819 issued April 31, 1988; U.S. No. 4,752,285 issued June 21, 1988; U.S. No. 4,915,685 issued April 10, 1990; U.S. No. 4,979,938 issued December 25, 1990; U.S. No. 5, 252, 022 issued October 5, 1993; U.S. No. 5,374,245 issued December 20, 1994; U.S. No. 5,498,235 issued March 12, 1996; U.S. No. 5,730,716 issued March 24, 1998; U.S. No. 6,001,088 issued December 14, 1999; U.S. No. 6,018,679 issued January 25, 2000; U.S. No. 6,139,537 issued October 31, 2000; U.S. No. 6,148,231 issued November 14, 2000; U.S. No. 6,154,671 issued November 28, 2000, and U.S. No. 6,167,302 issued December 26, 2000.

21. The method of claim 20, wherein the iontophoresis system used in step b) is a device selected in the group consisting of the devices disclosed in the U.S. patent No. 6,154,671 issued November 28, 2000.

22. A method to treat a disease comprising the administration of a chimeric oligonucleotide capable of reverting or inducing a mutation in a target gene of target cells, gene expression of which is associated to that disease, in a human or animal host in need of such treatment, wherein the method used for delivering *in vivo* said chimeric oligonucleotide into said target cells is the method according to claim 1.

23. The method to treat a disease according to claim 22, wherein said disease is an inherited pathology.

24. The method to treat a disease according to claim 22, wherein said disease is an inherited retinopathy.

25. A method to obtain an animal model comprising the administration of a chimeric oligonucleotide capable of reverting or inducing a mutation in a target gene of target cells of that animal, wherein the method used for delivering *in vivo* said chimeric oligonucleotide into said target cells is the method according to claim 1.

26. A method for the screening of pharmaceutical or cosmetic compounds comprising the use of an animal model, a target gene of target cells of which has been modified by the administration of a chimeric oligonucleotide capable of reverting or inducing a mutation in that target gene, wherein the method used for delivering *in vivo* said chimeric oligonucleotide into said target cells is the method according to claim 1.

27. A chimeric oligonucleotide DNA/2'OMeRNA type designed with two blocks of 2'O-methyl RNA residues flanking a stretch of DNA, poly(T) hairpin loops and a G-C clamp and wherein part of said DNA/2'OMeRNA sequence is complementary to a genomic DNA sequence of a target gene of said cells with the exception of at least single mismatched nucleotide in the DNA stretch when aligned with the target genomic DNA sequence, characterized in that said at least part of the sequence complementary to that target gene is selected from the group consisting of:

- an oligonucleotide sequence capable of reverting the non-sens C→A mutation in the codon 347 of the cDNA of the murine gene encoding the cGMP-phosphodiesterase β-subunit.

28. The chimeric oligonucleotide DNA/2'OMeRNA type according to claim 27 having the sequence SEQ ID No. 1.

29. A chimeric oligonucleotide DNA/2'OMeRNA type designed with two blocks of 2'O-methyl RNA residues flanking a stretch of DNA, poly(T) hairpin loops and a G-C clamp and wherein part of said DNA/2'OMeRNA sequence is complementary to a genomic DNA sequence of a target gene of said cells with the exception of at least single mismatched nucleotide in the DNA stretch when aligned with the target genomic DNA sequence, characterized in that said at least part of the sequence complementary to that target gene is selected from the group consisting of:

- an oligonucleotide sequence capable of inducing a nonsense mutation STOP in the DNA encoding the murine or human transcription factor HIF1α so that the protein expressed by such a mutated HIF1α gene is not functional;

- an oligonucleotide sequence capable of inducing the mutation E142-STOP in the protein coded by the mouse transcription factor HIF1α, or the corresponding mutation in the human HIF1α protein sequence;

- the oligonucleotide sequence having the sequence SEQ ID No. 2 or an oligonucleotide comprising a fragment thereof capable of inducing the same mutation.

30. A chimeric oligonucleotide DNA/2'OMcRNA type designed with two blocks of 2'O-methyl RNA residues flanking a stretch of DNA, poly(T) hairpin loops and a G-C clamp and wherein part of said DNA/2'OMcRNA sequence is complementary to a genomic DNA sequence of a target gene of said cells with the exception of at least single mismatched nucleotide in the DNA stretch when aligned with the target genomic DNA sequence, characterized in that said at least part of the sequence complementary to that target gene is selected from the group consisting of:

- an oligonucleotide sequence capable of reverting a mutation in the DNA encoding the human RP1 protein, said mutation being responsible for the expression of a non-functional protein;

- an oligonucleotide sequence capable of reverting the mutation K296E or R677-STOP in the human opsin or RP1 protein sequence;

- the oligonucleotide having the sequence SEQ ID No. 3 or an oligonucleotide comprising a fragment thereof capable of reverting the same mutation K296E; and

- the oligonucleotide having the sequence SEQ ID No. 4 or an oligonucleotide comprising a fragment thereof capable of reverting the same mutation R677-STOP.

31. A chimeric oligonucleotide DNA/2'OMeRNA type designed with two blocks of 2'O-methyl RNA residues flanking a stretch of DNA, poly(T) hairpin loops and a G-C clamp and wherein part of said DNA/2'OMeRNA sequence is complementary to a genomic DNA sequence of a target gene of said cells with the exception of at least single mismatched nucleotide in the DNA stretch when aligned with the target genomic DNA sequence, characterized in that said at least part of the sequence complementary to that target gene is selected from the group consisting of:

- an oligonucleotide sequence capable of inducing a mutation in the DNA encoding the murine RP1 protein, said mutation being responsible for the expression of a non-functional protein;

- an oligonucleotide sequence capable of inducing the mutation K296E or E348-STOP in the murine opsin or RP1 protein sequence;

- the oligonucleotide having the sequence SEQ ID No. 5 or an oligonucleotide comprising a fragment thereof capable of reverting the same mutation K296E; and

- the oligonucleotide having the sequence SEQ ID No. 6 or an oligonucleotide comprising a fragment thereof capable of reverting the same mutation E348-STOP.

32. A pharmaceutical composition comprising a chimeric oligonucleotide DNA/2'OMeRNA type of claims 27 to 30.

33. A method to treat a human host having a retinopathy induced by the presence of a mutation in the PR1 gene, comprising contacting in vivo the host PR1 genomic DNA with the chimeric oligonucleotide DNA/2'OMeRNA of claim 30.

34. A method to treat a human or an animal host having ocular neovascularization induced by the expression of the normal transcription factor HIF1α gene, comprising contacting in vivo the host HIF1α genomic DNA with the chimeric oligonucleotide DNA/2'OMeRNA of claim 29.

35. An animal model comprising a mutation in the RP1 gene, mutation which has been induced by the in vivo administration of a chimeric oligonucleotide wherein said chimeric oligonucleotide is a chimeric oligonucleotide according to claim 31.

36. Use of an animal model according to claim 35 for the screening of pharmaceutical compounds capable of treating human or animal retinopathies.